BRIEF COMMUNICATIONS

SUCCESSFUL BILOBECTOMY FOR PULMONARY VENOUS OBSTRUCTION AFTER BILATERAL LUNG TRANSPLANTATION

Enrico Ruffini, MD,[a] Giuliano Maggi, MD,[a] Guglielmo Actis-Dato, MD,[b] Antonio Cavallo, MD,[a] Alberto Oliaro, MD,[a] Andrea Agostinucci, MD,[a] and Maurizio Mancuso, MD,[a] *Torino, Italy*

Vascular complications after lung transplantation are a major cause of morbidity and death. We report a case of nonthrombotic pulmonary venous obstruction after bilateral lung transplantation with hemorrhagic infarction of the right upper and middle lobes successfully managed with an upper bilobectomy with excellent clinical and functional results.

Clinical summary. A 39-year-old man underwent bilateral lung transplantation for cystic fibrosis on November 22, 1997. The operation was performed without cardiopulmonary bypass. During the implantation of the right lung allograft, the atrial anastomosis was technically difficult because of poor access to the recipient's atrium. Total ischemic time was 360 minutes for the left lung allograft and 540 minutes for the right lung allograft. Postoperatively, a parenchymal consolidation of the upper half of the right lung was interpreted as implantation response and treated with negative fluid balance and antibiotics, with only partial resolution. However, the clinical conditions of the patient remained satisfactory, and extubation was accomplished on postoperative day (POD) 4. In the following days, the patient experienced increasing dyspnea and hemoptysis necessitating increasing oxygen requirements but without mechanical ventilation. A lung perfusion scan showed 39% of the blood flow to the right lung with a perfusion defect to the upper half of the right lung (Fig 1); computed tomographic scan revealed a consolidation of the posterior portion of the right upper lobe and of the lateral segment of the middle lobe (Fig 2). Transesophageal echocardiography with pulse-wave Doppler imaging showed a marked reduction of peak systolic flow velocity at the level of the right pulmonary vein anastomosis without intraluminal thrombi. As the conditions of the patient gradually worsened, an exploratory right thoracotomy was undertaken on POD 11. At operation, the upper and middle lobes were markedly congested; the lower lobe appeared normal. An upper bilobectomy was undertaken with ligation of the upper and middle branches of the right superior pulmonary vein distal to the atrial anastomosis. The postoperative course was uneventful except for an incomplete re-expansion of the right lower lobe that required prolonged chest tube and Heimlich valve use. The patient was discharged from hospital on POD 29, and the Heimlich valve was removed 1 week later. Three months after the transplantation, the patient is in excellent clinical conditions.

Discussion. Vascular complications after lung transplantation are not infrequent. Of these, pulmonary venous obstruction may be associated with serious morbidity and death. The obstruction may result either from thrombi in an otherwise patent atrial anastomosis or from stenosis of the pulmonary venous–atrial anastomosis (most often by technical pitfalls), which may or may not be associated with thrombosis caused by the reduced blood flow.

Pulmonary venous obstruction after lung transplantation should be suspected in every case of persistent pulmonary edema in the first postoperative days, often associated with a frothy blood-stained secretion from the endotracheal tube. Additional signs include hemodynamic instability that is insensitive to increased inotropic support, elevated pulmonary wedge pressure (which tends to return to normal if the tip of the Swan-Ganz catheter [Baxter Healthcare Corp, Edwards Division, Santa Ana, Calif] is moved contralaterally), parenchymal consolidation at chest radiographs and computed tomography scans, and reduced lung perfusion to the affected lung at perfusion scan. Transesophageal echocardiography with color-flow Doppler imaging is virtually diagnostic, demonstrating a marked reduction of the flow in the affected pulmonary vein. The severity of the clinical presentation primarily depends on 2 factors: (1) the type of transplantation, single or bilateral (in the latter case, the satisfactory function of the nonaffected lung may induce a less dramatic course and a late diagnosis of pulmonary venous obstruction), and (2) the primary disease in the case of a single lung transplantation, ranging from a less severe presentation in emphysema with modest pulmonary hypertension to a life-threatening emergency in primary pulmonary hypertension and pulmonary fibrosis where the native lung is severely compromised.

To our knowledge, only 4 cases of nonthrombotic pulmonary venous obstruction have been reported, all after single lung transplantation.[1-4] Three of those cases were managed by surgical revision and refashioning of the atrial anastomosis with a satisfactory recovery of the allograft in only 1 case. One case was treated with percutaneous balloon angioplasty, with modest resolution of the symptoms.

In addition to these cases, we are aware of only 1 major pulmonary resection after lung transplantation for pulmonary venous obstruction; in that case[5] a left atrial thrombus at the orifice of the inferior pulmonary vein caused hemorrhagic

From the Departments of Thoracic Surgery[a] and Cardiac Surgery,[b] University of Torino, Torino, Italy.

Received for publication March 2, 1998; accepted for publication April 28, 1998.

Address for reprints: Enrico Ruffini, MD, Department of Thoracic Surgery, University of Torino, 3, Via Genova 10126, Torino, Italy.

J Thorac Cardiovasc Surg 1998;116:648-9

0022-5223/98 $5.00 + 0 **12/54/91368**

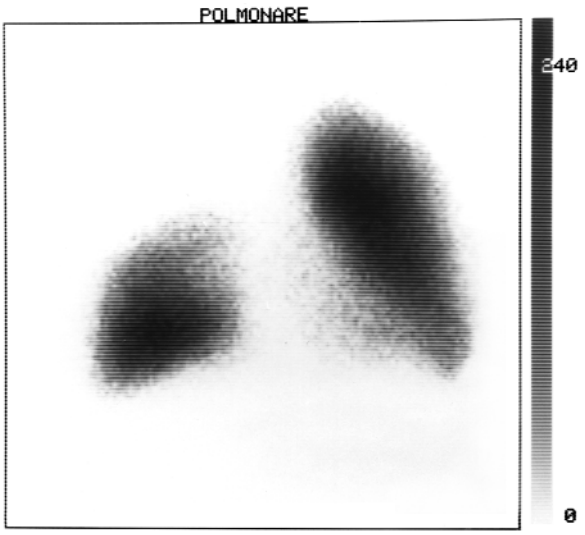

Fig 1. Lung perfusion scan performed on postoperative day 8 shows a perfusion defect in the upper half of the right lung allograft.

infarction of the left lower lobe after left single lung transplantation; a left lower lobectomy was undertaken, but the patient died shortly thereafter.

This is the first reported case of successful bilobectomy after lung transplantation; it is probable that the satisfactory performance of the contralateral allograft may have played a role in the successful outcome.

In conclusion, the occurrence of pulmonary venous obstruction after lung transplantation is a potentially serious complication that always requires a surgical approach. The operation is often technically demanding, as every second operation is, but the results are highly rewarding; revision and refashioning of the atrial anastomosis or, as the present case has shown, major pulmonary resection in the case of irreversible lung injury is associated with an excellent outcome.

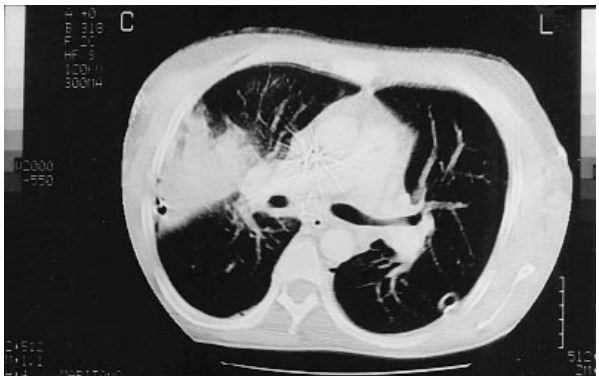

Fig 2. Computed tomographic scan performed on postoperative day 9 shows a consolidation of the posterior portion of the right upper lobe and the lateral segment of the middle lobe.

REFERENCES

1. Malden ES, Kaiser LR, Gutierrez FR. Pulmonary vein obstruction following single lung transplantation. Chest 1992;102:645-7.
2. Griffith BP, Magee MJ, Gonzalez IF, Houel R, Armitage JM, Hardesty RL, et al. Anastomotic pitfalls in lung transplantation. J Thorac Cardiovasc Surg 1994;107:743-54.
3. Clark SC, Levine AJ, Hasan A, Hilton CJ, Forty J, Dark JH. Vascular complications of lung transplantation. Ann Thorac Surg 1996;61:1079-82.
4. Cherqui MM, Brusset A, Liu N, Raffin L, Schlumberger S, Ceddaha A, et al. Intraoperative transesophageal echocardiographic assessment of vascular anastomoses in lung transplantation: a report on 18 cases. Chest 1997;111:1229-35.
5. Sarsam MA, Yonan NA, Beton D, McMaster D, Deiraniya AK. Early pulmonary vein thrombosis after single lung transplantation. J Heart Lung Transplant 1993;12:17-9.